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# ZOOLOGICAL SERIES OF FIELD MUSEUM OF NATURAL HISTORY

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## EIGHT NEW BATS OF THE GENUS RHINOLOPHUS

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During recent work on a revision of the bats of the genus *Rhinolophus* eight new forms were discovered. These are described here in advance of a complete report, which will appear later.

I wish to thank Mr. M. A. C. Hinton and Mr. T. C. S. Morrison-Scott for their help while I was at the British Museum (Natural History) and for permission to describe two of these new forms. Through the generosity of Dr. H. Boshma and Dr. G. C. A. Junge of the Rijksmuseum van Natuurlijke Historie in Lieden, I am able to describe two others.

This work was done with the aid of a Fellowship from the John Simon Guggenheim Memorial Foundation and with the permission of Field Museum of Natural History, during parts of 1938 and 1939.

### ***Rhinolophus keyensis annectens* subsp. nov.**

*Type* from Wetter Island, Southwest Islands, Flores Sea, Dutch East Indies. No. C, 1372 Rijksmuseum van Natuurlijke Historie, Leiden. Adult male in alcohol. Collected June 7, 1898, by Dr. Schardler.

*Characters*.—An Oriental member of the *megaphyllus* group closely related to *Rhinolophus keyensis* and *R. virgo*.

Length of metacarpals as in *keyensis* and *virgo*, fourth metacarpal being longest and third longer than fifth. Second phalanx of third metacarpal more than one and one-half times length of first phalanx; in the others it is barely equal to or is shorter than the first phalanx. Intermediate in size between *keyensis* and *virgo*. Sella parallel-sided for about three-quarters of the distance from base, and the sides converging slightly to square tip. The connecting process rises well back from the edge of the sella, farther back than in *keyensis*. Lancet high, narrow, and rather sharply pointed, sides straight as in *keyensis*.



The skull is so badly broken that no adequate description can be given of it, but it appears to be very much like that of *keyensis*. Upper premolar two is in the toothrow. Lower premolar three is almost in the row while in *keyensis* it is external. This could easily be individual variation. The infraorbital bridge is about half as wide as in *keyensis*.

*Measurements*.—Forearm 39.2; third finger, metacarpal 29.7, first phalanx 11.6, second phalanx 17.7; fourth finger, metacarpal 30, first phalanx 8.4, second phalanx 10.5; fifth finger, metacarpal 29.2, first phalanx 8.7, second phalanx 10.9; tibia 25.5; tail 17.4. Ear 19; height of lancet 8; width of sella 1.5; width of horseshoe 8.5. Skull broken; upper toothrow 6.4.

*Specimens examined*.—One, the type.

*Remarks*.—This form is a link between *Rhinolophus virgo* of the Philippines and *R. keyensis* of the Key Islands.

### ***Rhinolophus chaseni* sp. nov.**

*Rhinolophus minor* Pousargues, Mission Pavie Indo-Chine, Etudes Diverses, 3, p. 554, 1904; Kloss, Jour. Nat. Hist. Soc. Siam, 4, p. 80, 1921.

*Type* from Pulo Condore, off the southeast coast of Cochin China. No. 21.10.8.3 British Museum (Natural History). Adult male in alcohol. Collected November 12, 1920, by C. B. Kloss.

*Characters*.—An Oriental member of the *megaphyllus* group related to *R. malayanus*, and with same wing formula.

Metacarpal of third finger shortest; metacarpals of fourth and fifth fingers about equal. Second phalanx of third finger less than one and one-half times the length of the first phalanx.

Like *malayanus* but sella wider and more constricted, lancet shorter and ear longer. The skull larger in every way but in general similar to that of *malayanus*. Upper premolar two in the toothrow; lower premolar three external.

*Measurements*.—Forearm 41.1; third finger, metacarpal 30.6, first phalanx 11.8, second phalanx 17.4; fourth finger, metacarpal 31.4, first phalanx 8.5, second phalanx 10.5; fifth finger, metacarpal 31.7, first phalanx 9.3, second phalanx 10.9. Ear 21; tibia 20.6; tail 17.7. Base of sella 2.4, tip 2.

Skull: greatest length 18.8; condylo-basal length 16.1; palatal length 2.5; width of nasal swellings 5.4; interorbital width 2.6; zygomatic width 9.8; mastoid width 8.9; width of braincase 7.7; upper toothrow 7.3; width across canines 5; maxillary width 7.1; supraorbital length 5.



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*Specimens examined*.—One, the type. Also the cotypes and large series of *R. malayanus*.

*Remarks*.—*Rhinolophus chaseni*, while not appearing to have any very outstanding characters, is different from any of the forms related to *borneensis* and *malayanus* and is geographically distant from all except *malayanus*. It is named for Dr. F. N. Chasen, Director of the Raffles Museum.

***Rhinolophus thomasi latifolius* subsp. nov.**

*Rhinolophus* sp. Osgood, Field Mus. Nat. Hist., Zool. Ser., 18, p. 219, 1932.

*Type* from Muong Moun, Tonkin, French Indo-China. No. 32230 Field Museum of Natural History. Adult female. Collected March 14, 1929, by R. E. Wheeler. Orig. No. 39.

*Characters*.—Like *thomasi* in size and wing structure, second phalanx of third metacarpal being more than one and one-half times the length of the first phalanx, and second phalanx of fifth metacarpal shorter than first phalanx. The parallel-sided sella is much wider than in *thomasi*, being 2.3 against 1.8 mm., and the ear and tail are a little longer.

The skull has the same characters found in *thomasi*, being short and relatively broad, with maxillary width greater than length of upper tooththrow; total length between four and four and one-half times supraorbital length, with low nasal swellings; the teeth are slightly narrower. Upper premolar two is in the tooththrow. Lower premolar three is external except in one specimen, where it is in the tooththrow.

*Measurements*.—Type (paratypes in parentheses): Forearm 42.5 (42.6–45.7). Skull: greatest length 18.4 (18.2–18.7); condylo-basal length 15.7 (15.6–16); palatal length 2.1 (1.9–2.2); width across nasal swellings 5.1 (5.1–5.3); interorbital width 2.6 (2.5–2.5); zygomatic width 9.7 (9.2–9.8); mastoid width 9.2 (8.8–8.9); braincase 8 (7.6–8.1); upper tooththrow 6.8 (6.8–7); width across canines 4.9 (4.6–4.9); maxillary width 7.3 (7–7.2).

External measurements of alcoholic specimen: Forearm 44.7; third finger, metacarpal 33.6, first phalanx 13.5, second phalanx 20.8; fourth finger, metacarpal 34.9, first phalanx 10.4, second phalanx 12.3; fifth finger, metacarpal 35.7, first phalanx 10.7, second phalanx 9.6. Ear 20; tail 24; tibia 18.

*Specimens examined*.—Total five. French Indo-China: Muong Moun, Tonkin, one male (type), one female (alc.); Muong Mo, Tonkin, three females.

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*Remarks.*—The wider sella will easily separate this form from typical *thomasi*. *Rhinolophus thomasi* was formerly known from the type locality only, Karin Hills, Burma, but *R. t. latifolius* and the next form show that it has a wide range both north and south of Burma.

***Rhinolophus thomasi septentrionalis* subsp. nov.**

*Rhinolophus affinis tener* Osgood, Field Mus. Nat. Hist., Zool. Ser., 18, p. 216, 1932.

*Type* from Nguluko (27.5° N. Lat., 100° 15' E. Long.), north of Likiang, Yunnan, China. No. 32291 Field Museum of Natural History. Adult male. Collected February 9, 1929, by Herbert Stevens.

*Characters.*—Like *thomasi* in wing structure, and in shape and size of sella and lancet, but in other parts much larger. Skull larger and upper premolar two only half in row instead of being wholly in row. Posterior edge of palatine narrower, less rounded than in *thomasi* and *t. latifolius*.

*Measurements.*—Type (paratypes in parentheses): Forearm 51.6 (51–55). Skull: greatest length 20.6 (19.8–20.9); condylo-basal length 18.1 (17.1–18); palatal length 2.4 (2.1–2.5); width across nasal swellings 5.6 (5.3–5.5); interorbital width 2.6 (2.5–2.8); zygomatic width 10.5 (10.5–10.9); mastoid width 9.7 (9.4–9.8); braincase 8.2 (8.1–8.6); upper toothrow 8.3 (7.6–8.1); width across canines 5.8 (5.3–5.7); maxillary width 8.5 (8–8.6).

External measurements of 15 alcoholic specimens: Forearm 52–55; third finger, metacarpal 36.9–39.5, first phalanx 15.6–18, second phalanx 26.5–29.8; fourth finger, metacarpal 39–41.5, first phalanx 11.3–13.1, second phalanx 15.1–18; fifth finger, metacarpal 40.5–43.5, first phalanx 13.2–15, second phalanx 9.9–12.5. Ear 19–21; tail 20.3–24.9; tibia 19.7–21.5.

*Specimens examined.*—Total 25. Nguluko, Yunnan, China, 11 males (6 alc.), 12 females (9 alc.) (F.M.). Su Shan Chang, Likiang, Yunnan, China, 1 male, 1 female (Amer. Mus. Nat. Hist.).

*Remarks.*—The wing structure and maxillary width easily identify this bat. The large size separates it from typical *thomasi*.

***Rhinolophus osgoodi* sp. nov.**

*Rhinolophus lepidus* subsp. Osgood, Field Mus. Nat. Hist., Zool. Ser., 18, p. 214, 1932.

*Type* from Nguluko (27° 5' N. Lat., 100° 15' E. Long.), north of Likiang, Yunnan, China. No. 33296 Field Museum of Natural History. Adult male. Collected February 27, 1929, by H. Stevens.

*Characters*.—Externally very like *R. lepidus* but sella parallel-sided, connecting process more rounded and lancet less hastate. General color above light brown, base of hairs light gray; below light gray. Fifth metacarpal usually a trifle longer than fourth; third shortest.

Skull small for a bat with so long a forearm. Shape as in *lepidus* but smaller with especially shorter toothrows. Mastoid width greater than zygomatic width. Upper premolar two in row; lower premolar three external or half in row.

*Measurements*.—Type (paratypes in parentheses): Forearm 43.3 (41.5–45.8). Skull: greatest length 16.2 (16.2–16.4); condylo-basal length 14.4 (14.2–14.5); palatal length 2.4 (2.4–2.6); width of nasal swellings 4.3 (4.2–4.3); interorbital width 2.1 (2.1–2.2); zygomatic width 7.7 (7.6–7.7); mastoid width 8 (8–8.2); width of braincase 6.7 (6.7–6.9); upper toothrow 5.8 (5.7–5.8); across canines 3.8 (3.5–3.8); maxillary width 5.8 (5.6–5.8).

External measurements of seven alcoholic specimens: Forearm 42.9–45.8; third finger, metacarpal 32.8–33.9, first phalanx 11.7–13.6, second phalanx 14.7–16.3; fourth finger, metacarpal 33.2–34.5, first phalanx 8.8–9.9, second phalanx 10.5–12.5; fifth finger, metacarpal 33.9–34.8, first phalanx 10.5–11.8, second phalanx 10.3–12.2. Ear 12–20; tail 17.5–20.8; tibia 16.6–18.2.

*Specimens examined*.—Total 10. Nguluko, Yunnan, China, 7 males (4 alc.), 3 females (alc.).

*Remarks*.—As Dr. Osgood has already pointed out (l.c.), this species combines characters found in both the *lepidus* and *refulgens* sections. The greater mastoid width is a character of *lepidus* while the parallel-sided sella is found in *refulgens* and *feae*. The skull is smaller than in any of these. The species is named in honor of Dr. Osgood, who first noticed these differences but who did not have the material needed at the time to work out the characters fully.

### ***Rhinolophus formosae* sp. nov.**

*Type* from Formosa. No. 46001 Field Museum of Natural History. Adult male in alcohol. Collected by M. Maki.

*Characters*.—A member of the *luctus* group, about the size of *beddomei*. Sella higher but narrower than that of *trifoliatius*. Lancet long, sides not concave, tip blunt, forming a long triangle. Ears with short, blunt point, being but slightly concave on outer edge. Wing structure and attachment as in all other members of the *luctus* group. Color very dark brown.



Skull about the size of *beddomei* but much narrower. Sagittal crest sloping gradually toward post-nasal depression. Upper premolar two in row; lower premolar three in row, but in type more crowded on one side than on the other.

*Measurements*.—Forearm 60.2; third finger, metacarpal 40.4, first phalanx 23.5, second phalanx 30.5; fourth finger, metacarpal 47.4, first phalanx 12.5, second phalanx 21.8; fifth finger, metacarpal 48.8, first phalanx 14.4, second phalanx 21.8. Ear 32; tibia 32.8; tail 39.8. Skull broken: greatest length 27.4; width across nasal swellings 6.5; zygomatic width 12.4 plus; mastoid width 11.7; width of braincase 10; upper toothrow 10.2.

*Specimens examined*.—One, the type.

*Remarks*.—The nearest geographic neighbor of *Rhinolophus formosae* is *R. lanosus* from Fukien, which it resembles in some characters, although it is much smaller. Considering the solitary and retiring habits of this group of bats it is not surprising that a member of it has not been found in Formosa until now.

### ***Rhinolophus aethiops diversus* subsp. nov.**

*Type* from Bakel, Senegal, French West Africa. No. 19.7.7.2774 British Museum (Natural History). Adult female in alcohol. Collected September 27, 1887. From the Lataste collection.

*Characters*.—Averages smaller than either *a. aethiops* or *a. eloquens*, with a narrower horseshoe and sella and a shorter lancet. The type, when dried, is darker than *aethiops*, being in general a faded brown. The hairs above are of uniform color to the base; below they are slightly darker at the base. The type, however, has been in alcohol for many years and the only skin is more than one hundred years old.

The type skull is like that of *aethiops* but much smaller. Upper premolar two is present on one side only and is so minute that it is hard to see even with a lens. Lower premolar three is present on both sides and is also very minute.

*Measurements*.—Type (maximum and minimum of topotypes in parentheses): Forearm 53.2 (52.8–55.6); third finger, metacarpal 40.6 (39–40.7), first phalanx 16 (16–17.7), second phalanx 30.3 (30–31.5); fourth finger, metacarpal 41.9 (41–42.7), first phalanx 9.6 (9.8–10.3), second phalanx 18.7 (17.9–18.7); first finger, metacarpal 41.9 (42–44), first phalanx 12.6 (12.5–13.2), second phalanx 13.9 (14.1–14.6). Ear 27 (27–28); tail 28.6 (28.8–32.7); tibia 22.6 (22.8–23.5). Skull of type: greatest length 23.1; condylo-basal

length 19.6; palatal length 2.9; width across nasal swellings 6.1; interorbital width 2.6; zygomatic width 11.9; mastoid width 10.5; width of braincase 9.5; upper tooththrow 8.8; width across canines 6.6; maxillary width 8.7; supraorbital length 6.4.

*Specimens examined*.—Total 7. Bakel, Senegal, 2 males (alc.), 2 females (alc.); "River Gambia," 1, no sex. Nerokoro, near Tambikunda, Sierra Leone, 1 male (alc.), 1 female (alc.). All in British Museum.

*Remarks*.—All the forms of *R. aethiops* are very much alike except *a. hildebrandti*, which is the largest. *R. diversus* does not agree very well either with typical *aethiops* from Angola or with *a. eloquens* from the Sudan, being smaller and darker. The two specimens from Sierra Leone are not included in the measurements as they are both subadult and are only referred to *R. diversus*.

### ***Rhinolophus arcuatus angustifolius* subsp. nov.**

*Type* from Wetter Island, Southwest Islands, Flores Sea, Dutch East Indies. No. D, 1371 Rijksmuseum van Natuurlijke Historie, Leiden. Adult male in alcohol. Collected June 7, 1898, by Dr. Schardler.

*Characters*.—Like *arcuatus* from the Philippines but lancet and horseshoe a little narrower and sella much narrower, 2.1 at base against 3.5 in *arcuatus*. Tail the same length as tibia instead of being shorter. In this character it approaches *toxopei*, in which the tail is longer than the tibia. Wing structure as in *arcuatus*.

Skull as in *arcuatus* but upper premolar two half external, the canine and premolar three being separated by a narrow space. Nasal swellings converging as in *arcuatus*, being narrower across top than in *beccarii*.

*Measurements*.—Forearm 46.6; third finger, metacarpal 35.2, first phalanx 14.1, second phalanx 22.3; fourth finger, metacarpal 35.7, first phalanx 9.7, second phalanx 13.6; fifth finger, metacarpal 36.5, first phalanx 10.3, second phalanx 12.3. Ear 22; tail 21.6; tibia 21.6. Skull: greatest length 20.1; condylo-basal length 16.8; palatal length 1.8; width across nasal swellings 5.2; interorbital width 1.7; zygomatic width 9.6; mastoid width 9.4; width of braincase 8.1; upper tooththrow 7.8; width across canines 5.3; maxillary width 7.5.

*Specimens examined*.—One, the type.

*Remarks*.—This form represents an extension of the range of true *arcuatus*, being less aberrant than *toxopei* from Buru Island to the north. With *arcuatus* now known from Sumatra and Wetter Island, it should be found on intermediate islands or in the Celebes.















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